

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. - 15. (canceled).

16. (currently amended): A leak detector for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the tank including a top plate, a bottom plate, and a side plate connecting the top plate and the bottom plate, ~~the top plate includes a through opening, wherein the leak detector comprising:~~

~~a flow-rate measuring portion, provided near a bottom end of the leak detector, for measuring a flow rate between liquid in the tank and liquid retained within the leak detector;~~
~~a bottom attaching portion provided at the bottom the leak detector is arranged inside the tank in such a manner that a first end of the leak detector is to detachably attach the bottom end to the bottom plate; and~~

~~a second top assembly, attached to the top plate so as to cover and opening provided in the top plate and having a through opening through which an upper end of the leak detector is supported in the through opening in such a manner that the upper end of the leak detector is movable relatively to the top plate in a direction substantially perpendicular to a surface of the liquid.~~

17. (currently amended): The leak detector according to claim 16, comprising:

a liquid inlet/outlet portion near the first bottom end through which the liquid flows in and out of the leak detector;

a flow-rate measuring unit arranged near the liquid inlet/outlet portion inside the leak detector toward the second upper end, and configured to measure an amount of flow of the liquid occurring through the liquid inlet/outlet portion; and

a liquid retaining portion arranged between the second upper end and the flow-rate measuring unit, and including a space configured to retain liquid that has flown therein through the liquid inlet/outlet portion.

18. (currently amended): The leak detector according to claim 17, wherein the first bottom end is detachably attached to the bottom plate with a magnet.

19. (currently amended): The leak detector according to claim 16, wherein the second upper end is supported in the through opening using an elastic member.

20. (previously presented): The leak detector according to claim 17, further comprising a protective member configured to protect the flow-rate measuring unit and the liquid retaining portion from the liquid, and arranged outside the flow-rate measuring unit and the liquid retaining portion, wherein

the protective member is formed with a metal having such a thermal expansion coefficient that a distance between the flow-rate measuring unit and the bottom plate is maintained substantially invariant.

21. (previously presented): The leak detector according to claim 20, wherein the protective member is formed with a material identical to a material of the tank.

22. (currently amended): The leak detector according to claim 16, further comprising an intermediate member formed with a magnetic material, and arranged at the ~~first-bottom~~ end such that the leak detector is attached to the bottom plate through the intermediate member.

23. (previously presented): The leak detector according to claim 17, wherein the flow-rate measuring unit includes

a flow path portion through which liquid flows between the space and the liquid inlet/outlet portion;

at least one temperature detecting unit configured to detect temperature of liquid inside the flow path;

a heating unit configured to heat the liquid inside the flow path portion; and

a controlling unit configured to control heating temperature of the heating unit for heating the liquid inside the flow path portion so that the temperature of liquid inside the liquid retaining portion and the temperature of the liquid inside the flow path portion become substantially equal.

24. (currently amended): A leak detector for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the leak detector comprising:

a liquid retaining portion including a space configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank;

a flow path portion through which the space communicates with an interior of the tank and through which the liquid flows in and out;

a flow path opening/closing unit configured to open and close at least one end of the flow path portion to control the flow of the liquid into the flow path portion;

a flow-rate measuring unit configured to measure an amount of the liquid flowing inside the flow path portion, wherein said flow path opening/closing unit is located near said flow-rate measuring unit; and

a calibrating unit configured to calibrate the flow-rate measuring unit.

25. (currently amended): The A leak detector according to claim 24 for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the leak detector comprising:

a liquid retaining portion including a space configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank;

a flow path portion through which the space communicates with an interior of the tank and through which the liquid flows in and out;

a flow path opening/closing unit configured to open and close at least one end of the flow path portion;

a flow-rate measuring unit configured to measure an amount of the liquid flowing inside the flow path portion; and

a calibrating unit configured to calibrate the flow-rate measuring unit,

wherein the flow-rate measuring unit includes

at least one temperature detecting unit configured to detect temperature of liquid inside the flow path portion;

a heating unit configured to heat the liquid inside the flow path portion; and

a controlling unit configured to control heating temperature of the heating unit for heating the liquid inside the flow path portion so that the temperature of liquid inside the liquid retaining portion and the temperature of the liquid inside the flow path portion become substantially equal.

26. (previously presented): The leak detector according to claim 24, wherein the calibrating unit calibrates the flow-rate measuring unit based on a signal corresponding to temperature of liquid being inside the flow path portion without flowing .

27. (previously presented): The leak detector according to claim 24, wherein the flow-path opening/closing unit includes a solenoid valve.

28. (currently amended): A leak detector for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the tank including a top plate, a bottom plate, and a side plate connecting the top plate and the bottom plate, ~~the top plate includes a through opening,~~ the leak detector comprising:

a liquid retaining portion including a space configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank;

a flow path portion through which the space communicates with an interior of the tank and through which the liquid flows in and out;

a flow path opening/closing unit configured to open and close at least one end of the flow path portion;

a flow-rate measuring unit provided near a bottom end of the leak detector and configured to measure an amount of the liquid flowing inside the flow path portion; and

a calibrating unit configured to calibrate the flow-rate measuring unit; wherein
a bottom attaching portion provided at the bottom end of the leak detector is arranged
inside the tank in such a manner that a first end of the leak detector is to detachably attached
attach the bottom end to the bottom plate; and

a second-top assembly, attached to the top plate so as to cover an opening provided in the
top plate and having a through opening through which an upper end of the leak detector is
supported in the through opening in such a manner that the upper end of the leak detector is
movable relatively to the top plate in a direction substantially perpendicular to a surface of the
liquid.

29. (currently amended): The leak detector according to claim 28, wherein
the first bottom end is detachably attached to the bottom plate with a magnet.

30. (currently amended): The leak detector according to claim 28, wherein

the ~~second-upper~~ end is supported in the through opening using an elastic member.

31. (previously presented): The leak detector according to claim 28, wherein
the flow-rate measuring unit includes

at least one temperature detecting unit configured to detect temperature of liquid
inside the flow path portion;
a heating unit configured to heat the liquid inside the flow path portion; and
a controlling unit configured to control heating temperature of the heating unit for
heating the liquid inside the flow path portion so that the temperature of liquid inside the liquid
retaining portion and the temperature of the liquid inside the flow path portion become
substantially equal.

32. (previously presented): The leak detector according to claim 28, wherein
the calibrating unit calibrates the flow-rate measuring unit based on a signal
corresponding to temperature of liquid being inside the flow path portion without flowing.

33. (previously presented): The leak detector according to claim 28, further comprising
a protective member configured to protect the flow-rate measuring unit and the liquid
retaining portion from the liquid, and arranged outside the flow -rate measuring unit and the
liquid retaining portion, wherein

the protective member is formed with a metal having such a thermal expansion coefficient that a distance between the flow-rate measuring unit and the bottom plate is maintained substantially invariant.

34. (previously presented): The leak detector according to claim 33, wherein the protective member is formed with a material identical to a material of the tank.

35. (previously presented): The leak detector according to claim 28, wherein the flow-path opening/closing unit includes a solenoid valve.

36. (currently amended): A leak detecting system for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the tank including a top plate, a bottom plate, and a side plate connecting the top plate and the bottom plate, ~~the top plate includes a through opening,~~ the leak detecting system comprising:

a leak detector arranged inside the tank in such a manner that a ~~first~~bottom end of the leak detector is detachably attached to the bottom plate and ~~a second~~an upper end of the leak detector is supported in ~~the~~a through opening provided in the top plate in such a manner that ~~the~~upper end of the leak detector is movable relatively to the top plate in a direction substantially perpendicular to a surface of the liquid; and

a controller configured to control the leak detector.

37. (currently amended): The leak detecting system according to claim 36, wherein the leak detector includes

a liquid inlet/outlet portion near the first bottom end through which the liquid flows in and out of the leak detector;

a flow-rate measuring unit arranged near the liquid inlet/outlet portion inside the leak detector toward the second upper end, and configured to measure an amount of flow of the liquid occurring through the liquid inlet/outlet portion; and

a liquid retaining portion arranged between the second upper end and the flow-rate measuring unit, and including a space configured to retain liquid that has flown therein through the liquid inlet/outlet portion.

38. (currently amended): A leak detecting system for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the leak detecting system comprising:

a leak detector including

a liquid retaining portion including a space configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank;

a flow path portion through which the space communicates with an interior of the tank and through which the liquid flows in and out;

a flow path opening/closing unit configured to open and close at least one end of the flow path portion so as to control the flow of liquid into the flow path portion;

a flow-rate measuring unit configured to measure an amount of the liquid flowing inside the flow path portion, wherein the flow path opening/closing unit is located near the flow-rate measuring unit; and

a calibrating unit configured to calibrate the flow-rate measuring unit; and
a controller configured to control the leak detector.

39. (previously presented): A leak detecting system for detecting leakage of liquid stored in a tank based on fluctuation in a level of the liquid, the tank including a top plate, a bottom plate, and a side plate connecting the top plate and the bottom plate, ~~the top plate includes a through opening,~~ the leak detecting system comprising:

a leak detector including

a liquid retaining portion including a space configured to retain liquid flown into the leak detector, the liquid flown being a part of the liquid in the tank;

a flow path portion through which the space communicates with an interior of the tank and through which the liquid flows in and out;

a flow path opening/closing unit configured to open and close at least one end of the flow path portion;

a flow-rate measuring unit provided near a bottom end of the leak detector and configured to measure an amount of the liquid flowing inside the flow path portion; and

a calibrating unit configured to calibrate the flow-rate measuring unit; and
a controller configured to control the leak detector, wherein

the leak detector is arranged inside the tank in such a manner that a ~~first bottom~~ end of the leak detector is detachably attached to the bottom plate and ~~a second an upper~~ end of the leak detector is supported in ~~the a~~ through opening provided in the top plate in such a manner that ~~the upper end of~~ the leak detector is movable relatively to the top plate in a direction substantially perpendicular to a surface of the liquid.